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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/580,767	05/26/2006	Zoe Paula Lock	06-380	8325
20306 7590 05/21/2008 MCDONNELL BOEHNEN HULBERT & BERGHOFF LLP 300 S. WACKER DRIVE 32ND FLOOR CHICAGO, IL 60606				
EXAMINER FERNANDEZ RIVAS, OMAR T				
ART UNIT		PAPER NUMBER		
2129				
MAIL DATE		DELIVERY MODE		
05/21/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/580,767

Applicant(s)

LOCK ET AL.

Examiner

OMAR F. FERNANDEZ RIVAS

Art Unit

2129

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 May 2006 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/CIS)
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date 11/13/2006

DETAILED ACTION

1. Claims 1-39 are pending on this application.

Specification

2. The abstract of the disclosure is objected to because the abstract of the disclosure does not commence on a separate sheet in accordance with 37 CFR 1.52(b)(4). A new abstract of the disclosure is required and must be presented on a separate sheet, apart from any other text. Correction is required. See MPEP § 608.01(b).
3. The Applicant's cooperation is also respectfully requested in revising the specification and correcting any grammatical errors contained therein.

Claim Objections

4. Claim 17 is objected to because of the following informalities: in line 2, the claim recites "...fulfilment of least one of..." The claim should read "...fulfilment of **at** least one of..." Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "a rule covering a proportion of positive examples of data" The term "proportion" in claim 1 is a relative term which renders the claim indefinite. The term "proportion" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Without a restriction or definition as to what this proportion entails and how it limits the claim, a person of ordinary skill in the arts would not be able to determine the scope of the invention and therefore would not be able to replicate the invention without engaging in undue experimentation.

Claims 2 recites limitations similar to that of claim 1 and is rejected on the same basis.

Claims 3-19 depend on claim 2 and incorporate the same deficiencies as set forth above and furthermore fail to correct the deficiencies.

Claims 20-29 and 30-39 recite limitations similar to that of claims 1 and 2-19 and are rejected on the same basis.

Claims 9, 25 and 35 recite: "...at least one anomaly characterization rule has a form that an anomaly **is detected or otherwise** by application of the rule..." The claim seems incomplete since it is not clear what **otherwise** means in respect to the form of

the anomaly (does it means that it will have a form if the anomaly is not detected, does it means that it can have any form...).

Claims 10-15 depend on claim 9 or are dependent from claims depending on claim 9, but fail to cure the deficiencies set forth above.

Claims 25, 28-29 and 35, 38-39 recite limitations similar to that of claims 9-15 and are rejected on the same basis.

Claims 11, 27 and 37 recite: "...a variable in the **at least one** anomaly characterisation rule which is defined as being in constant mode and is numerical is at least partly evaluated by providing a range of values for the variable" In mathematics and the mathematical sciences, a constant is a fixed, but possibly unspecified, value. This is in contrast to a variable, which is not fixed (see www.wikipedia.com). It is unclear how a "variable" can be a "constant" and then change the value of the "constant" (a fixed value). The claims also recite "selecting a value having optimum accuracy". However, the claims do not specify what this "accuracy" is referring to or what it is measuring. A person of ordinary skill in the arts would not be able to determine the metes and bounds of this limitation in the claims without engaging in undue experimentation since "accuracy" could measure a number of parameters in a system.

Claim 12 recites the limitations "relatively widely spaced" and "relatively narrowly spaced" The terms "relatively widely" and "relatively narrowly" in claim 12 are relative terms which render the claim indefinite. The terms "relative" "widely" and "narrowly" are not defined by the claim, the specification does not provide a standard for ascertaining

the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Without a restriction or definition as to what these terms entail and how they specifically limit the claim, a person of ordinary skill in the arts would not be able to determine the scope of the invention and therefore would not be able to replicate the invention without engaging in undue experimentation.

Claim 13 recites: "...duplicates and rule equivalents, i.e. any rule having..." It is not clear what is the intent of the limitations following the i.e. statement (is it supposed to be a limitation or is it just an example?) Simply stated, the "i.e." statement renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim 16 recites the limitation "the refinement encoding cost". There is insufficient antecedent basis for this limitation in the claim.

Claims 28 and 38 recite "lteq conditions" However, the claims do not define what "lteq" means.

Claim Rejections - 35 USC § 101

7. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-39 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The computer system must set forth a practical application of judicial exception to produce a real-world result. Benson, 409 U.S. at 71-

72, 175 USPQ at 676-77. The invention is ineligible because it has not been limited to a substantial practical application.

For a claimed invention to be statutory the claimed invention must produce a useful, concrete, and tangible result. As the Supreme Court has made clear, "[a]n idea of itself is not patentable," *Rubber-Tip Pencil Co. v. Howard*, 20 U.S. (1 Wall.) 498, 507 (1874); taking several abstract ideas and manipulating them together adds nothing to the basic equation. *In re Warmerdam*, 31 USPQ2d 1754 (Fed. Cir. 1994).

For a claimed invention to be statutory under 35 U.S.C. 101, the claims must produce a tangible result, and there must be a practical application, by either: 1) transforming (physical thing) or 2) by having the FINAL RESULT (not the steps) achieve or produce a useful (specific, substantial, AND credible), concrete (substantially repeatable/non-unpredictable), AND tangible (real world/non-abstract) result.

A claim that recites a computer that solely calculates a mathematical formula is not statutory.

In the present case, claim 1 describes a method for anomaly detection. However the claim fails to produce a useful result because the claimed subject matter fails to sufficiently reflect at least one practical utility set forth in the descriptive portion of the specification. More specifically, while the described practical utility (utilities) is (are) directed to producing an alarm or a report to explain why an event was flagged as potentially fraudulent (as described at e.g., pg 10, L27 to pg. 11, L23 of the specification of the instant application), the claimed subject matter relates ONLY to applying test data to detect anomalies. The claim is directed to mere abstract manipulation of abstract

data. In and of itself, detecting anomalies is useless in a real world situation absent a particular substantial application, such as presenting the results of the anomalies detected to a user. The claims are not limited to a substantial practical application because they encompass arbitrary abstract manipulation of data to detect something with no specific purpose or use.

The claim also fails to produce a concrete result because the claimed subject matter fails to be limited to the production of an assured, repeatable result. More specifically, the claimed subject matter is not repeatable because the claim recites that the rule set will be developed from a training data set and "any available relevant background knowledge data". Since there is no description as to what this "relevant background data" is or a restriction as to what this data is (any could be all, one, more than one, etc.) the method may not necessarily consider the same data in order to develop the rules. Therefore, different results may be produced given the same data as inputs (not a repeatable result).

A tangible result is not produced because the claimed subject matter fails to produce a result that is limited to having real world value rather than a result that may be interpreted to be abstract in nature as, for example, a thought, a computation, or manipulated data. More specifically, the claimed subject matter provides for a method to for applying test data to detect anomalies, which could be simply a number or any abstract object. This produced result remains in the abstract and, thus, fails to achieve the required status of having real world value.

Claims 2 recites limitations similar to that of claim 1 and is rejected on the same basis.

Claims 3-19 depend on claim 2 and incorporate the same deficiencies as set forth above and furthermore fail to correct the deficiencies.

Claims 20-29 and 30-39 recite limitations similar to that of claims 1 and 2-19 and are rejected on the same basis.

Claims 30-39 recite a computer readable medium. As described in pg. 42, L15-21 of the specification of the instant application, the computer readable medium (or carrier medium as described) could be an electrical or optical signal. Under this definition, this embodiment does not fall within one of the statutory categories of invention.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-39 are rejected under 35 U.S.C. 102(b) as being anticipated by Agarwal et al. (US Patent #6,782,377, referred to as **Agarwal**).

Claims 1, 2, 20 and 30

Agarwal anticipates a method of anomaly detection incorporating the steps of:

a) developing a rule set of **at least one** anomaly characterisation rule from a training data set and **any** available relevant background knowledge using at least first order logic, a rule covering a proportion of positive anomaly examples of data **in the training data set** (**Agarwal**: abstract; C1, L15-65; C3, L10-59; C4, L16-67; C6, L1-50; C8, L5-54; C13, claim 1; Fig. 2; Examiner's Note (EN): item 14 applies. The rarely occurring target class examples are considered anomalies of data. Note that since the claim recites "**any** available relevant data", it may happen that there is no available relevant data, therefore this limitation may not affect the operation of the method), and b) applying the rule set to test data for anomaly detection therein (**Agarwal**: C6, L 1-56; C13, claim 1; C15, claim 10; EN: item 14 applies. Applying the classifier model (the rule set) to the dataset is considered applying "test data" to the rule set).

Regarding claim 20, the claim recites "Computer apparatus for anomaly detection **programmed to execute** the steps of..." It has been held that the recitation that an element is "adapted to" (or in this case programmed to) perform a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. In re Hutchison, 69 USPQ 138. The subject matter of a properly construed claim is defined by the terms that limit its scope. It is this subject matter that must be examined. As a general matter, the grammar and intended meaning of terms used in a claim will dictate whether the language limits the claim scope. Language that suggests or makes optional but does not require steps to be performed or does not limit a claim to a particular structure does not limit the scope of a claim or

claim limitation. This statement applies to claims 22 and 26-29, all of which recite "programmed to".

Claims 3, 21 and 31

Agarwal anticipates the positive anomaly examples are associated with fraud or software vulnerabilities (**Agarwal**: C1, L15-27).

Claims 4, 22 and 32

Agarwal anticipates developing the rule set using Higher-Order logic (**Agarwal**: C1, L49-65; C8, L5-55; C12-13, appendix 1-2).

Claims 5, 23 and 33

Agarwal anticipates developing the rule set by: a) forming an alphabet having selector functions allowing properties of the training data set to be extracted, together with **at least one** of the following: additional concepts, background knowledge constant values and logical AND and OR functions (**Agarwal**: C1, L28 to C2, L14; C3, L10-59; C6, L1-56; C7, L28 to C8 L26; C12-13, appendix 1-2), b) forming current rules from combinations of items in the alphabet such that type consistency and variable consistency is preserved (**Agarwal**: abstract; C3, L10-59; C6, L11-56; C13, claim 1; EN: the P-rules and the N-rules), c) evaluating the current rules for adequacy of classification of the training data set (**Agarwal**: abstract; C3, L1-59; C4, L16-67; C5, L23-38; C6, L11 to C7, L27; C8, L27 to C9, L24; C14, claims 6-8; EN: note that no

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restriction or structure has been defined for determining "adequacy" in the claim), d) if no current rule adequately classifies the training data set, generating new rules by applying **at least one** genetic operator to the current rules, a genetic operator having **one of** the following functions: i) combining two rules to form a new rule, ii) modifying a single rule by deleting one of its conditions or adding a new condition to it, or iii) changing one of a rule's constant values for another of an appropriate type (**Agarwal**: C1, L15 to C2, L14; C3, L10-59; C4, L16-67; C6, L11 to C7, L18; C7, L28 to C9, L24; C12-13, appendix 1-2), and e) designating the new rules as the current rules and iterating steps c) onwards until a current rule adequately classifies the training data set **or** a predetermined number of iterations is reached (**Agarwal**: C1, L15 to C2, L14; C3, L10-59; C4, L16-67; C6, L11 to C7, L18; C7, L28 to C9, L24; C12-13, appendix 1-2; EN: the stopping criterion).

Claims 6, 24 and 34

Agarwal anticipates data samples in the training data set have characters indicating whether or not they are associated with anomalies (**Agarwal**: C1, L28-35; C3, L11-59; C6, L1 to C7, L3; EN: the positive and negative examples in the dataset or labeled data).

Claim 7

Agarwal anticipates detecting telecommunications **or** retail fraud from anomalous data (**Agarwal**: C1, L15-27; EN: telecommunication is the transmission of signals over a

distance for the purpose of communication).

Claim 8

Agarwal anticipates employing inductive logic programming to develop the rule set (**Agarwal**: abstract; C1, L28 to C2, L44; C3, L11-59; C6, L1 to C7, L3; C12-13, appendix 1-2; EN: item 14 applies. Inductive logic programming (ILP) is a subfield of machine learning which uses logic programming as a uniform representation for examples, background knowledge and hypotheses. Schema: *positive examples + negative examples + background knowledge => hypothesis* (see www.wikipedia.com).

Claims 9, 25 and 35

Agarwal anticipates the **at least one** anomaly characterisation rule has a form that an anomaly is detected **or otherwise** by application of the rule according to whether or not a condition set of **at least one** condition associated with the rule is fulfilled (**Agarwal**: C1, L15-19; C6, L1 to C7, 27; C8, L27 to C9, L64; C15, claim 10; EN: condition not further defined or restricted to any particular structure. As long as any condition is satisfied, this limitation is met).

Claims 10, 26 and 36

Agarwal anticipates the **at least one** anomaly characterisation rule is developed by refining a most general rule by **at least one of**: a) addition of a new condition to the condition set; and b) unification of different variables to become constants or structured

terms (**Agarwal**: C1, L49 to C2, L34; C3, L11-59; C6, L1 to C7, L27; C8, L27 to C9, L24).

Claims 11, 27 and 37

Agarwal anticipates a **variable** in the **at least one** anomaly characterisation rule which is defined as being in constant mode and is numerical is at least partly evaluated by providing a range of values for the variable, estimating an accuracy for each value and selecting a value having optimum accuracy (**Agarwal**: C4, L16-49; C6, L1 to C9, L24; EN: item 14 applies. Note the accuracy and support values and determining if a refined rule is accepted or if a current rule is best).

Claim 12

Agarwal anticipates the range of values is a first range with values which are relatively widely spaced, a single optimum accuracy value is obtained for the variable, and the method includes selecting a second and relatively narrowly spaced range of values in the optimum accuracy value's vicinity, estimating an accuracy for each value in the second range and selecting a value in the second range having optimum accuracy (**Agarwal**: C6, L1 to C9, L24).

Claim 13

Agarwal anticipates filtering to remove rule duplicates and rule equivalents, i.e. any rule having like but differently ordered conditions compared to another rule, and any

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rule which has conditions which are symmetric compared to those of another rule

(**Agarwal:** C1, L49 to C2, L14; C6, L1 to C7, L3).

Claim 14

Agarwal anticipates filtering to remove unnecessary 'less than or equal to' ("lteq") conditions (**Agarwal:** C1, L49 to C2, L14; C6, L1 to C7, L3; EN: After a rule is learned, the records where its antecedent is true are removed).

Claim 15

Agarwal anticipates the unnecessary lteq conditions are associated with **at least one of** ends of intervals, multiple lteq predicates and equality condition and lteq duplication (**Agarwal:** C1, L49 to C2, L14; C6, L1 to C7, L3).

Claim 16

Agarwal anticipates implementing an encoding length restriction to avoid overfitting noisy data by rejecting a rule refinement if the refinement encoding cost in number of bits exceeds a cost of encoding positive examples covered by the refinement (**Agarwal:** C3, L45-59; C7, L29 to C8, L4).

Claims 17, 29 and 39

Agarwal anticipates stopping construction of a rule in response to fulfillment of **least one of** three stopping criteria, such criteria being: a) the number of conditions in

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any rule in a beam of rules being processed is greater than or equal to a prearranged maximum rule length, b) no negative examples are covered by a most significant rule, which is a rule that: i) is present in a beam currently being or having been processed, ii) is significant, iii) has obtained a highest likelihood ratio statistic value found so far, and iv) has obtained an accuracy value greater than a most general rule accuracy value, and c) no refinements were produced which were eligible to enter the beam currently being processed in a most recent refinement processing step (**Agarwal**: C6, L11 to C7, L18; C7, L28 to C9, L24; C12-13, appendix 1-2).

Claim 18

Agarwal anticipates adding the most significant rule to a list of derived rules and removing positive examples covered by the most significant rule from the training data set (**Agarwal**: C1, L49 to C2, L14; C4, L16-67; C6, L1 to C9, L64; Fig. 2).

Claim 19

Agarwal anticipates a) selecting rules which have not met rule construction stopping criteria, b) selecting a subset of refinements of the selected rules associated with accuracy estimate scores higher than those of other refinements of the selected rules, and c) iterating a rule refinement, filtering and evaluation procedure to identify any refined rule usable to test data (**Agarwal**: C4, L16-67; C6, L1 to C9, L64; Fig. 2).

Claims 28 and 38

Agarwal anticipates **programmed to** filter out at least one of rule duplicates, rule equivalents and unnecessary lteq conditions (**Agarwal**: C1, L49 to C2, L14; C6, L1 to C7, L3; EN: item 14 applies. After a rule is learned, the records where its antecedent is true are removed).

Examination Considerations

10. Examiner has cited particular columns and line numbers (or paragraphs) in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific imitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the Applicant in preparing responses, to fully consider the references in their entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner. The entire reference is considered to provide disclosure relating to the claimed invention.

11. The claims and only the claims form the metes and bounds of the invention. "Office personnel are to give the claims their broadest reasonable interpretation in light of the supporting disclosure. In re Morris, 127 F.3d 1048, 105455, 44USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. In re Prater, 415 F.2d, 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969)" (MPEP p 2100-8, c 2, I 45-48; p 2100-9, c 1, I 1-4). The

Examiner has full latitude to interpret each claim in the broadest reasonable sense.

Examiner will reference prior art using terminology familiar to one of ordinary skill in the art. Such an approach is broad in concept and can be either explicit or implicit in meaning.

12. Examiner's Notes are provided with the cited references to prior art to assist the applicant to better understand the nature of the prior art, application of such prior art and, as appropriate, to further indicate other prior art that maybe applied in other office actions. Such comments are entirely consistent with the intent and spirit of compact prosecution. However, and unless otherwise stated, the Examiner's Notes are not prior art but a link to prior art that one of ordinary skill in the art would find inherently appropriate.

13. Unless otherwise annotated, Examiner's statements are to be interpreted in reference to that of one of ordinary skill in the art. Statements made in reference to the condition of the disclosure constitute, on the face of it, the basis and such would be obvious to one of ordinary skill in the art, establishing thereby an inherent prima facie statement.

14. Examiner's Opinion: items 11-13 apply. The claims and only the claims form the metes and bounds of the invention. The Examiner has full latitude to interpret each claim in the broadest reasonable sense.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Teng et al. US Patent #5,222,197

Sartor et al. US PGPUB #2002/0161711

Yamanishi et al US Patent #7,353,214

Adjaoute US Patent # 7,089,592

16. Claims 1-39 are rejected.

Correspondence Information

17. Any inquires concerning this communication or earlier communications from the examiner should be directed to Omar F. Fernández Rivas, who may be reached Monday through Friday, between 8:00 a.m. and 5:00 p.m. EST. or via telephone at (571) 272-2589 or email omar.fernandezrivas@uspto.gov.

If you need to send an Official facsimile transmission, please send it to (571) 273-2589.

If attempts to reach the examiner are unsuccessful the Examiner's Supervisor, David Vincent, may be reached at (571) 272-3080.

Hand-delivered responses should be delivered to the Receptionist @ (Customer Service Window Randolph Building 401 Dulany Street Alexandria, VA 22313), located on the first floor of the south side of the Randolph Building.

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Omar F. Fernández Rivas
Patent Examiner
Artificial Intelligence Art Unit 2129
United States Department of Commerce
Patent & Trademark Office

/Omar F. Fernández Rivas/
Examiner, Art Unit 2129

Thursday, May 15, 2008.

/Joseph P. Hirl/
Primary Examiner, Art Unit 2129